3.0 SITE CONDITIONS

At the time of drilling, there were numerous buildings, warehouses, piping and equipment around the proposed location for the pipe rack. Boring B1 was located to the north of a hydrocarbon fuel storage tank. The surface of the surrounding area was exposed soil with standing water. Short grass covered the ground around boring B2, and a fuel farm was located to the north. The surface drainage at the boring locations was judged to be poor at B1 and fair at boring B2.

4.0 SUBSURFACE CONDITIONS

Based on the conditions encountered by the borings, the soil profile consisted of existing fill underlain by residual soils. Approximately 6-inches of topsoil was present at the surface at boring B2. The fill encountered in borings B1 to B2 was a light-brown to reddish-brown silty clay with rock fragments. Based on the SPT results, the fill material was stiff to very stiff. The fill at boring B1 was moist and extended to a depth of 9-ft below the ground surface. The fill at B2 was slightly moist and extended to a depth of 3.5-ft.

The residual soil encountered was generally silty clay and clayey silt. A number of sand lenses were also encountered during drilling. Brown clayey silt with chert fragments was observed in boring B1 from 20.5 to 26-ft. This silt was stiff in consistency. Very stiff sandy, clayey silt with weathered chert was encountered in B2B from 30 to 50-ft. This silt was yellowish-brown in color and wet. Silty clay was encountered from 9 to 18-ft and 26 to boring termination at 30-ft in boring B1, from 30 to 46-ft in B1A; and, from 3.5 to 11-ft, 13.5 to 18-ft and from 28 to 30-ft in boring B2. The lower samples contained chert fragments and were moist to wet. The color of the silty clay ranged from yellowish-brown, reddish-brown to gray and grayish-brown. Based on the SPT results, the clay was generally stiff to very stiff in consistency, but was soft from 3.5 to 5.5-ft and medium stiff from 13.5 to 18-ft in boring B2. Sand lenses were encountered in both borings at various depths below the ground surface. Reddish-brown and yellowish-brown clayey sand was encountered in boring B1 from 18 to 20.5-ft. This sand was moist to wet and loose. An orangish-brown dense sand was encountered in boring B2 at a depth of 11 to 13.5-ft. A reddish-brown and yellowish-brown medium dense silty sand was observed in boring B2 from 18 to 28-ft. This sand became wet with depth. Brown wet clayey sand with chert and gravel was encountered in boring B1A from 46 to 50-ft.

Groundwater was encountered in boring B1 at a depth of 20.4-ft, three hours after drilling was completed and in boring B2 at 25.7-ft at completion of drilling. Groundwater levels are greatly influenced by locally heavy rainfall and seasonally wet periods of the year. These seasonal changes also affect regional groundwater. Consequently, fluctuations in groundwater levels observed at the site may be anticipated.

The lower two soil samples from each boring were tested for pH and sulphate levels. Groundwater was collected and tested for pH with the results tabulated below. The results indicate a slightly acidic soil with relatively low level of sulphates, but an acidic groundwater.

SOIL BORING LOG

Project No.: TS 00-147
Project Name: Arnold Air Force Base
Tullahoma, Tennessee
Boring Location: See Boring Location Plan
Surface Elevation: na

Boring No.: B1
Date Drilled: 01-Aug-00
Driller/Rig: F. Jones/Acker
Water Level: @ drilling
Water Level: 20.4' @ 3 hours

DEPTH	SAMPLE	USCS	SOIL DESCRIPTION	SPT*	Wc	PP (tsf)	Recovery Rec (in)
	1	CL	FILL-CLAY, silty with rock fragments, medium plasticity, reddish-brown, very stiff, moist	13-13-10 N=23	11.4	4.5+	100
5	2			6-7-9 N=16	13.4	4.5+	100
	3			6-7-8 N=15	15.3	4.5+	100
10	4	CL	CLAY, silty, medium plasticity, reddish-brown and yellowish-brown, very stiff, moist, residual	4-7-12 N=19	24.8	2.5	100
15	5	CH	CLAY, silty, sandy, high plasticity, yellowish-brown and gray, stiff, moist, residual	4-5-5 N=10	48.8	0.75	100
20	6	SC	SAND, clayey, reddish-brown and yellowish-brown, moist to wet, loose, residual	2-3-5 N=8	36.1	0.5	100
	7		Shelby Tube taken 20 to 22-ft		36.1	2.25	
25	8	ML	SILT, clayey with chert fragments, medium plasticity, brown, stiff, wet, residual	3-4-20 N=24	34.8	0.75 LL=30 PL=27 PI=3	100
30	9	CH	CLAY, silty with chert fragments, high plasticity, brown, very stiff, moist to wet, residual	10-19-16 N=35	49.0	1.0	86
			Boring Terminated @ 30.0-ft				

USCS Unified Soil Classification System
Wc Water Content, as % of Dry Weight

* SPT - blows per 6" increments, N Value blows per foot
LL=Liquid Limit, PL=Plastic Limit, PI=Plasticity Index

SOIL BORING LOG

Project No.: TS 00-147
Project Name: Arnold Air Force Base
Tullahoma, Tennessee
Boring Location: See Boring Location Plan
Surface Elevation: na

Boring No.: B1A
Date Drilled: 14-Aug-00
Driller/Rig: F. Jones
Water Level: @ drilling
Water Level: 45.4 @ compl

DEPTH	SAMPLE	USCS	SOIL DESCRIPTION	SPT*	Wc	PP (tsf)
			CONTINUATION OF B1 IN AN OFFSET BORING			
35	9	CH	CLAY, silty with chert fragments, high plasticity, reddish-brown, dark brown, very stiff, wet, residual	11-9-8 N=17		
40	10	CH	CLAY, silty with dense chert, high plasticity, orangish-brown to brown, very stiff, wet, residual	18-30-50+1"		
45	11			19-13-14 N=27		
50	12	SC	SAND, clayey with chert and gravel, non-plastic, brown, medium dense, wet	6-6-6 N=12		
			Boring Terminated @ 50.0-ft			
55						
60						

USCS Unified Soil Classification System
Wc Water Content, as % of Dry Weight

* SPT - blows per 6" increments, N Value blows per foot
LL=Liquid Limit, PL=Plastic Limit, PI=Plasticity Index

SOIL BORING LOG

Project No.: TS 00-147
Project Name: Arnold Air Force Base
Tullahoma, Tennessee
Boring Location: See Boring Location Plan
Surface Elevation: na

Boring No.: B2
Date Drilled: 01-Aug-00
Driller/Rig: F. Jones/Acker
Water Level: none @ drilling
Water Level: none @ compl

DEPTH	SAMPLE	USCS	SOIL DESCRIPTION	SPT*	Wc	PP (tsf)	Recovery Rec (in)
			6" Topsoil				
	1	CL	FILL-CLAY, silty with rock fragments, medium plasticity, light brown, very stiff, moist	11-12-8 N=20			67
			Boring Terminated @ 3.0-ft				
5			(hit concrete, offset hole 2-ft north)				
10							
15							
20							
25							
30							

USCS Unified Soil Classification System
Wc Water Content, as % of Dry Weight

* SPT - blows per 6" increments, N Value blows per foot
LL=Liquid Limit, PL=Plastic Limit, PI=Plasticity Index

Tri-State Testing & Drilling, LLC — Chattanooga, Tennessee

SOIL BORING LOG

Project No.: TS 00-147
Project Name: Arnold Air Force Base
Tullahoma, Tennessee
Boring Location: See Boring Location Plan
Surface Elevation: na

Boring No.: B2A
Date Drilled: 01-Aug-00
Driller/Rig: F. Jones/Acker
Water Level: @ drilling
Water Level: 25.7' @ compl

DEPTH	SAMPLE	USCS	SOIL DESCRIPTION	SPT*	Wc	PP (tsf)	Recovery Rec (in)
			6" Topsoil				
	1	CL	FILL-CLAY, silty with rock fragments, medium plasticity, light brown, very stiff, dry	4-12-14 N=26	8.9		67
5	2	CL-ML	CLAY, SILT, medium plasticity, grayish-brown and reddish-brown, soft, moist, residual	2-1-3 N=4	18.6	1.0 LL=25 PL=18 PI=7	100
	3		becoming stiff	7-7-7 N=14	18.4	3.25	100
10	4		Shelby Tube taken 8 to 10-ft		25.7		
	5	SP	SAND, orangish-brown, dense, residual	3-4-46 N=50	32.2	1.25	100
15	6	CH	CLAY, silty, sandy, high plasticity, yellowish-brown and reddish-brown, medium stiff, moist, residual	2-2-4 N=6	47.3	1.0 LL=80 PL=25 PI=55	100
	7		Shelby Tube taken 16 to 18-ft				
20	8	SM	SAND, silty, reddish-brown and yellowish-brown, medium dense, residual	46-8-8 N=16	30.5	1.5	100
25	9		becoming wet	7-7-5 N=12	37.9	1.0	100
30	10	CH	CLAY, silty with chert fragments, high plasticity, reddish-brown, very stiff, wet, residual **Boring Terminated @ 30.0-ft**	12-13-15 N=28	24.0		39

USCS Unified Soil Classification System
Wc Water Content, as % of Dry Weight

* SPT - blows per 6" increments, N Value blows per foot
LL=Liquid Limit, PL=Plastic Limit, PI=Plasticity Index

Tri-State Testing & Drilling, LLC Chattanooga, Tennessee

SOIL BORING LOG

Project No.: TS 00-147
Project Name: Arnold Air Force Base
Tullahoma, Tennessee
Boring Location: See Boring Location Plan
Surface Elevation: na

Boring No.: B2B
Date Drilled: 14-Aug-00
Driller/Rig: F. Jones
Water Level: @ drilling
Water Level: 45.4 @ compl

DEPTH	SAMPLE	USCS	SOIL DESCRIPTION	SPT*	Wc	PP (tsf)
			CONTINUATION OF B2A IN AN OFFSET BORING			
35	9			12-21-16 N=37		
		ML	SILT, sandy, clayey with weathered chert, medium plasticity, yellowish-brown, very stiff, wet, residual			
40	10			12-12-16 N=28		
45	11			6-7-7 N=14		
50	12			10-19-25 N=44		
			Boring Terminated @ 50.0-ft			
55						
60						

USCS Unified Soil Classification System
Wc Water Content, as % of Dry Weight

* SPT - blows per 6" increments, N Value blows per foot
LL=Liquid Limit, PL=Plastic Limit, PI=Plasticity Index

Description of Soil Classification System

Sands and Gravels

No. of Blows	Relative Consistency
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
Over 50	Very Dense

Silts and Clays

No. of Blows per foot (N)	Relative Consistency*
0 - 2	Very soft
2 - 4	Soft
5 - 9	Medium Stiff
10 - 15	Stiff
16 - 30	Very Stiff
31 - 50	Hard
Over 50	Very Hard

* Actual soil consistency can be less if N value is elevated due to rock fragments

Relative Proportions

Descriptive Term	Percent
with Trace	1 - 10
with Little	11 - 20
with Some	21 - 35
with	36 - 50

Plasticity

High Plasticity: LL > 50 or PI > 30
Medium Plasticity: 50 > LL > 35 or 30 < PI < 22
Low Plasticity: LL < 35 or PI < 22

Origin

Residual: derived by in place by weathering of parent rock
Alluvial: water deposited soil
Colluvial: gravity deposited soil
Loess: wind blown silt deposit
Fill: placed by man

Particle Size Identification

Boulders: 8-inch diameter or more

Cobbles: 3 to 8-inch diameter

Gravel:
- Medium: .50 to 1-inch
- Fine: .25 to .50-inch

Sand:
- Coarse: 2.00-mm to .25-inch (diameter of pencil lead)
- Medium: 0.42-mm to 2.00-mm (diameter of broom straw)
- Fine: 0.074-mm to 0.042-mm (diameter of human hair)

Silt: 0.042-mm to 0.002-mm (cannot see particles)

Clay: <0.002-mm